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FACTORS AFFECTING TECHNOLOGY INTEGRATION:

A K-12 INLAND EMPIRE PROFILE

A Project
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Education: Instructional Technology Option

by
Carol Elizabeth Doucette

September 1996

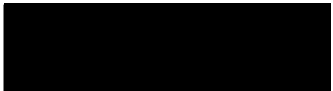
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Approved by:



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9/1/96

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ABSTRACT

This paper researches and discusses three factors that affect the integration of technology in the Inland Empire: environmental support, skill deficiency and motivation. A survey was conducted by questionnaire among pre- and in-service teachers at California State University, San Bernardino to determine levels for each factor, how they compare, and how they might explain the presence or lack of technology in the curriculum.

Results showed that teachers in the Inland Empire have a high level of motivation regarding technology use; a lower level of environmental support; and a level of skill deficiency which is low in terms of basic computer skills (word processing, spreadsheet, database) and high in terms of emerging technology skills (telecommunications, authoring). These levels support teachers' assessment of technology use at 72%, indicating some lack of technology usage.

ACKNOWLEDGEMENTS

This paper is the culmination of a twenty two year long, glorious, nonstop, whirlwind pursuit of education. With its completion, I see only new and exciting doors of exploration open ahead for me. For the many people who are the great motivators in my life, I thank you with all my heart: To my parents and family, who have always stressed the ethics of hard work and perseverance; to my roommate Christina Roever, for putting up with me during the writing of this paper; to Dr. Rowena Santiago for her guidance; to the Bemis School Staff for their helpful daily reminders; to the Lord Jesus Christ, without whose help I would have never finished; and most of all, to Russell Hilbig for his love and support.

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CHAPTER I

INTRODUCTION

PROBLEMS IN THE INTEGRATION OF TECHNOLOGY

In an ideal classroom in the 1990s, one would expect to find several things: eager children, a tireless teacher, lots of books, and of course, a computer. But is the computer covered with dust and shoved into a corner? Or is it an active, integral part of the learning that goes on in that classroom? There are winds of change blowing in and around education, and many teachers have taken it upon themselves to integrate this change, while many others have decidedly fought against it or have simply ignored it.

Why is it that while computers have seemingly taken on every aspect of society, in some educational settings, they remain either non-existent or only "game playing" stations? Why are they often not viewed as the valuable tools and resources that today's students need to learn how to utilize? Research has shown that there are great advantages to integrating technology into education (Seymour, 1993; Kinnaman, 1994; Harrington, 1993; Hawkins, 1994). Students benefit from learning vital computer skills that will allow them access to an ever growing technological world. But research also shows that the integration of computers into today's classrooms is not happening widespread (Hannafin & Savenye, 1993; Finkel, 1993; November, 1993).

Of course, there are many excellent programs that do exist and there are teachers teaching children the necessary technological skills needed to survive in this world. But what causes these programs to work, when other schools have tried and failed? And why do some schools try, yet some pretend computers do not exist? The following section presents several reasons why technology is not being integrated into the existing curriculum.

Hawkins (1994), Kinnaman (1995), and Buchsbaum (1992) state that low integration of technology in school districts today can be summed up by any teacher: Too much curriculum already on the docket to be taught, not enough money allocated toward technology, outdated technology already in place at the site, lack of knowledge as to how to use the existing technology and lack of time to learn how to use it. Some teachers feel too old to learn a new way of doing things, do not want to take the time to learn how to integrate it into their classrooms, or are just not interested. Dyrli and Kinnaman (1995) even cite student behavior and overcrowded classrooms as reasons given by teachers as to why technology is not being integrated at particular sites. But are these the only reasons for the low integration of technology into today's classrooms?

The theory put forth by Robert Mager and Peter Pipe (1970) in their book, *Analyzing Performance Problems or 'You Really Oughta Wanna'*, likens the issue of technology integration in our schools with any other kind of change in

any setting, be it in the educational or business world. Mager and Pipe ponder the eternal question every person involved in a major change has asked, Why isn't what is supposed to be happening, happening?!

CAUSES OF NONPERFORMANCE

Mager and Pipe's book opens with the words, "People don't do things for zillions of the darndest reasons. . . ." (p.1) and from there points to three main factors that lead to training and integration problems in any given setting. These are: skill deficiency, motivation, and environmental support.

Mager and Pipe (1970) say that if there is a performance problem in what is supposed to be happening, the question, "Is it a skill deficiency?" should be asked. Lack of basic skills could be the cause of the performance problem. Is he/she not performing as desired because he/she does not know how to do it? If this is so, Mager and Pipe say the primary remedy for a genuine skill deficiency must be to teach the person the skills needed to do it.

Motivation, continue Mager and Pipe, is important especially if the answer to the question, "Is it a skill deficiency?" is no. Rather than modify the person's skill or knowledge, modifications associated with the performance must be addressed. Changes are needed so the job the person does will be more attractive, less repulsive and more desirable to him.

Environmental support, as defined by Mager and Pipe, is given when a person in charge works hard at taking away obstacles which hinder a person's performance. That is, if a certain change is not happening, the higher up clears the way by doing things that make the worker's job easier. This could range from changing the lighting, adding an extra chair, to such things as ongoing training and time for open discussion. Desired performances are often not given because of an obstruction in the world surrounding the worker.

IS INTEGRATION IMPORTANT?

Before looking closely at any cause of nonperformance, including the area of technology integration, Mager and Pipe advise asking the question, "Is it important?" In this case, is technology integration into today's classrooms important to the overall American educational system?

Technology integration is the use of technology available to teachers to enhance their teaching of curricular subjects, such as language arts or math. It also involves developing in students the basics of computer literacy skills, such as word processing, drawing, use of telecommunications, and other technologies. Integration of technology into the curriculum can begin in kindergarten and continue through the twelfth grade, with teachers using different technologies to present and display information, check skill progression, assess learning, and use basic computer skills, as utility or productivity tools.

In the coming years, Seymour (1993) predicts the increasing importance of students knowing how to use different technologies and knowing how these technologies will affect their growing world. Kinnaman (1995) stresses that students will need to learn to utilize technological skills when they enter society. Harrington (1993) says that teachers need to equip their students for a future in an increasingly technological society and to adequately prepare them to use computers effectively. Because of technology's rampant reign in all other areas of society, the need for it in education is ever more important. Hawkins (1994) adds that teachers who use technology are only providing the same education in an even better way. In the literature review in the next chapter, this paper will support the claim that integration of technology into education is a vital and important issue.

Having established that the integration of technology into the classroom is important, Mager and Pipe's three causes of nonperformance, as applied to technology integration, are discussed in the following section.

SKILL DEFICIENCY

Kinnaman (1995) claims that teachers with skill deficiencies in both basic computer skills and in integrating technology into the curriculum are still part of the problem of low technology integration in our schools. Many teachers do not even know the basics of technology, such as turning on

the computer, saving and printing files, or running simple programs such as word processing, databases and spreadsheets. Consequently, many teachers do not know how to integrate technology into their classrooms (Buchsbaum, 1992). If teachers do not know how to operate a computer or are not taught how to integrate technology into the existing curriculum, it is not feasible to expect them to use technology effectively. It is then hypothesized that teachers do not use technology in their classrooms because they lack vital technological skills.

MOTIVATION

If a teacher is obviously capable of learning about teaching with computers, but has either chosen not to, or has just gone through the motions of acquiring basic technological skills and integration techniques, but does nothing about using these skills in his/her classroom, the caused factor here is motivational. Mager and Pipe say this is where the "he really oughta wanna" part comes in. In the case of technology integration, the teacher may not believe in the technology or may not be comfortable using it. Technology may be perceived to be just more work to do. If teachers are too busy, technology may make work look much harder. Teachers could also be afraid of technology and/or indifferent to it. This could be due to anxiety and fear about technology replacing the teacher or there is the lack of perceived relevance between technology and the tasks

performed by the teacher in the classroom. These are all possible reasons that can strongly decrease motivation for teachers to not use technology in their classrooms. It is therefore hypothesized that teachers do not use technology in their classrooms because they lack motivation.

ENVIRONMENTAL SUPPORT

Mager and Pipe (1970) recommend "water(ing) the performances you want to grow" (p.67). This addresses specifically the administration of school districts, asking them to provide a supportive environment for technology integration. This leads to the third and final factor: environmental support.

Environmental support in terms of access to hardware and software needs to be provided to teachers. Technical assistance that is both on site and ongoing should be part of the school's technology integration plan. Adequate time should be put aside for teachers to learn about technology integration. Basic computer literacy skills training for teachers should be addressed as well. Incentive-based-training should also be offered so that teachers will be more receptive of the idea of bringing technology into the classroom on a daily basis. When these environmental support issues are not addressed, motivation as well as performance are also affected.

Environmental support is the safety cushion that needs to surround teachers so they will feel comfortable as they

acquire computer skills and apply them in their own classrooms. Without this feeling of comfort provided on site, teachers will not even attempt to acquire the skills needed to teach with technology. It is then hypothesized that teachers do not use technology in their classrooms because there is a lack of environmental support.

OBJECTIVES OF THIS PROJECT

Technology integration is important; yet it is not widely implemented in today's schools. There are three possible causes to this situation: skill deficiency, lack of motivation, and minimal environmental support. The goal of this paper is to investigate, through a literature review and through a teachers' survey, as to what degree each of the three causes of nonperformance apply to the lack of integration of technology into the curriculum. This investigation will be specific to K-12 teachers in the Inland Empire.

Teachers' responses to the survey will provide data about their level of computer literacy, their degree of motivation, and the level of environmental support at their school sites. Using the collected data, the cause(s) for the lack of technology integration in schools will be analyzed by comparing their levels of computer literacy, motivation and environmental support. Trends in their computer training, motivation and administrative support provided will also be described.

CHAPTER II

REVIEW OF RELATED LITERATURE

In looking at the integration of technology in today's schools, this chapter presents a review of the related literature which traces the growth of the role of technology in society, the need for technology in education, and addresses the three hypothesized causes of nonperformance in technology integration in schools.

PREVALENCE OF TECHNOLOGY IN SOCIETY

The prevalence of technology in our society started during the second half of the last century. Odvard Egil Dyrli, Co-Director of the *Technology & Learning* Professional Development Institute, and Daniel Kinnaman, computer education coordinator for the Windham Public Schools in Willimantic, CT, point out that the construction of the Information Superhighway actually began when Samuel Morse sent the first telegraph message from Washington D.C. to Baltimore (1995).

In the past few decades this construction has continued on a vast scale. Just by turning on the television, which of course is a form of technology, it is obvious to even a lay person that technology is here to stay. Roberta Hawkins (1994) emphasizes this idea that technology is pervasive and long lasting. She states,

The difference with this fad (the technology movement) is that unlike the others, it won't pass. Technology is a significant factor not only in the educational marketplace but in the general marketplace. In all domains of our lives, technology touches us, from electronic transfer of funds in banks, to cash machines in grocery stores, and automatic payment with credit cards for gas - to say nothing of E-mail in our places of employment (p.16).

It is easy to observe that technology is prevalent in our society, from ATMs to VCRs, from "pay at the pump" to surfing the 'net. Dyrli and Kinnaman (1995) estimate that by the dawn of the next century, the average American family will possess no less than two personal computers, and also an endless array of other audio/visual devices.

The advent of the technological age began with the introduction of still photography in the 1840s and the counting machines first used in the 1890 U.S. Census. Following major technological advances throughout history, film, or motion pictures comes next. Film refers to the celluloid material on which a series of still images is chemically imprinted. The human eye uses 'persistence of vision' to see the 'frames' as moving images. The technology of motion pictures was first used in the 1920s (Heinich Molenda, and Russell, 1993).

The introduction of magnetic tape recording came in the 1940s with what is commonly referred to 'reel-to-reel.' This added actual recorded sound to be used along with the film. The now familiar cassette tape was introduced in the 1960s (Heinich et al., 1993).

Heinich et al.(1993) continue by saying that television made its debut at the World's Fair at St. Louis in 1920. Recorded events could be broadcast onto personal sets around the country. Video primarily means, 'I see' in Latin and refers to the media format that employs a cathode ray screen to present a moving picture. In the late 1970s, video recorders became available to the public and soon people could record everyday events and play them back on their own television sets with both picture and sound.

Although computers first came about in the 1930s, according to Heinich et al.(1993), they were slow to process, cost millions of dollars, and took up a tremendous amount of space. The advent of the microcomputer in 1975 brought the possibility of using computer technology into the common person's home as well into the classroom. The silicon microchip lowered the cost and put the roomfuls of original circuitry into a small chip.

Banks, ticket agencies, travel agents, supermarkets, and numerous other businesses have literally assaulted the public with computerized ways of doing almost anything (Heinich et al., 1993).

And finally, moving into the 1990s, telecommunications has allowed ordinary people, including school children, to come in contact with many far away and interesting places through the use of a modem, a device that uses phone lines to connect computers everywhere and allow them to communicate with each other.

Photographs, slide projectors, overhead projectors, tape recorders, film cameras, videotapes, videodiscs, music compact discs, huge mainframe computers and many other technologies have all permeated the world in the last one hundred and fifty years. The saturation of machines and technology in our society today is staggering enough without even considering the impact this will have on society's future. Schools have tried to keep up with the changing face of technology, but the medium seems to have grown too fast for educational budgets and bureaucracy to keep up.

NEED FOR TECHNOLOGY INTEGRATION IN SCHOOLS

With technology abounding in society, it would be easy to assume or even hope that technology would also be pervasive in our schools, which Harrington (1993) regards as "the sacred places where the future generation of America is in training" (p.5). Because computers and other technologies permeate almost every aspect of society, Hannafin and Savenye (1993) state,

This general acceptance in society should ensure that schools continue to strive to prepare their graduates for a world that demands computer literacy (p.27).

Kinnaman (1995) also stresses the need for the technological advances in society to be brought into the schools. Students will need to learn to utilize these technological skills when they enter that society. But he continues to say there is a problem with this not happening.

He states,

Unfortunately, however, our schools are generally ill-prepared to take advantage of the educational power of multimedia. To put it bluntly, there is a huge gap between what (is known) about teaching, learning, and technology, and what (is done) in our schools (p.62).

There are teachers who *do* want to incorporate technology into their curriculum. Harrington (1993) says that some teachers view it as an obligation to equip their students for a future in an increasingly technological society and to adequately prepare them to use computers effectively. Schrum (1991) adds that politicians and policy makers are constantly reminding educators that it is their duty to introduce students to these new age tools.

But it seems that as these changes are taking place, education has somehow managed to stand still. Continuing their analogy with the inventor of the telegraph, Dyrli and Kinnaman (1995) conclude that if Morse were alive today, he would be amazed at the speed at which communication and information technologies have advanced, but he would be even more amazed that for the most part, the focus point of curriculum in the classrooms of today is still the same as it was in his day: the textbook.

Because of technology's rampant reign in all other areas of society, the need for it in education is ever more important. Convincing some stagnant educators of this need for change is the hard part. Hawkins (1994) adds,

Teaching teachers how to teach with technology is to teach teachers to see the good in what they are already doing and the ways technology can enable it to get even better (p.17).

Instead of fearing technology, Hurst (1994) recommends that schools look at it this way:

To teach a generation weaned on Nintendo, VCRs and home PCs, computers are simply a new kind of chalkboard that make teachers' instruction more effective (p.74).

Today's students are truly the future citizens of this highly technological world. It is up to the educational system to teach them the skills necessary to learn to control it. Seymour (1993) adds, "Technology is the process by which we attempt to extend human potential to improve and control our world" (p.47). Dyrli and Kinnaman (1995) conclude that if American education is to continue to succeed, there is no question that computer technologies must be fully integrated into the classroom curriculum.

HARDWARE/SOFTWARE SUPPORT AND ACCESS

The literature shows that there actually is technology in schools. The issue is whether or not it is being used to its fullest potential. Hardware and software is being purchased, donated, bartered for, awarded, or gotten a hold of, in as many ways schools can think of. Curtin, et al. (1994) speak of just one of many examples of monies spent on hardware and software at a school in Texas:

The center has supplied each project classroom at Bowie Elementary with: a telephone, four computers, a printer, a laser disc player, television connections, microphones, speakers, headphones, video digitizing boards, modems, and CD-ROM drives that are all networked with Ethernet software; and various software for elementary students, including *Kid Pix*, *HyperCard*, and *Storybook Weaver* (p.77).

There are other examples: Buchsbaum (1992) reports that in Washington D.C. in 1983, well before many other states were getting on the technology bandwagon, eight schools each had an Apple computer, a videodisc player, and a telecommunications link to an education network at Stanford University. Today, a million dollars a year is spent on hardware and software alone in Washington D.C.. Jefferson Junior High has 213 computers for its 799 students -- a one-to-four ratio.

Even rural areas have access to hardware. Siegel (1995), writing in the journal *Electronic Learning*, reports that Educator of the Year 1995, Kathy Popp, worked with three third grade teachers who together wrote a grant proposal. The Board of Education in Chestnut Ridge, Pennsylvania agreed to fund their proposal for \$31,000, putting six computers in each of the teachers' classrooms.

Feil (1996) says that when districts or individual sites spend money on technology, about 55% goes to hardware, and 30% to software. Money is even spent on the more recent technology of networking. Schuster (1993) relates how a principal in St. John's County, Florida links teachers

together and to himself by making sure that each teacher has a Macintosh SE connected to a schoolwide AppleShare network.

The concern here is that while substantial money is budgeted and spent on equipment, little is actually spent on the inservice, preservice, training or just plain hands on time teachers need to gain knowledge of how to use this equipment and integrate it into their classrooms (Feil, 1996). Siegel (1995) emphasizes that commitment to technology requires more than just the purchase of new hardware and software. Schuster (1993) quotes Roger Coffee, the principal mentioned earlier, who summed up the situation with the statement, "I'd been in too many schools where lots of money had been spent on computers that were sitting under dust" (p.28). This is the classic problem of putting the cart before the horse. Kinnaman (1994) reports on many a school executive that has said, "Now that we've got the technology, we need someone in here to get our teachers up to speed" (p.62).

Technology is everywhere and most schools have supported it at least from a hardware/software point of view. But the research shows that this is not enough. Dyrli and Kinnaman (1995) conclude,

Technology affords the opportunity to make sweeping changes in education, but if we waste it on the same old curriculum and don't change our approach to teaching, we haven't changed anything. Our basic position is that good technology in the hands of good teachers will work educational miracles, and make it truly possible for school to be more than just a place (p.43).

What teachers need is not only the actual equipment, but formal and continuing training to gain skills on how to best utilize technology in their classrooms.

TEACHER TRAINING

Many individual school sites and districts are investing in hardware and software. But what sort of technology training should teachers be getting? What skills are important and needed to help them fully integrate technology into their classrooms? Education is the only profession that does not value its workers (teachers) as lifetime learners. November (1993) relates that an engineer is paid up to 100 days a year to learn, but the average teacher in the United States gets only one to three days.

Teachers are not feeling very well prepared, skillwise, when it comes to technology, especially when they compare themselves to their contemporaries in the community. Kinnaman (1994) identifies professional development as an excellent place to start, because there is no element of schooling more important than teaching. According to Hurst (1994), what teachers need is on-going flexible inservice training that is personal and individualized.

Finkel (1993) says that no matter how one calls it -- staff development, teacher training, or inservice education, schools need to be sure to include a detailed, well-funded section of their technology plan devoted to skills training and direction in integration into actual classrooms. The key

word here being well-funded. According to Feil (1996), most districts spend less than 15% of their technology budgets on training. Lots of money, as mentioned before, goes into the mechanics and operation of equipment, but not enough given for actual training in basic skills and for integrating technology into the curriculum. Glenn (1993) adds that there is definitely more hardware available in schools than training and curriculum materials.

Rather than money spent on only hardware and software, districts need to model the plan set forth by the Director of Educational Technology for the Public Schools in New Orleans, Sharon McCoy Bell. She oversees a budget of \$2 million, 20-25% of which is spent on staff development. She shares the following regarding teacher inservice in technology: "always align the training with the educational goals of the district; focus on teaching and learning, not on hardware and software, and, involve everyone" (Bell, 1995).

Teachers must be given the training needed, not just handed the hardware and software and told to use it. Munday, Windham, and Sampler (1991) agree that this training will not only empower the teachers, but also their students through the use of technology.

What kinds of technology skills do teachers need? Hurst (1994) suggests further the following question when planning a site support system in technology: what are the core skills in technology that teachers should be familiar with?

The State of California's Clear Teaching Credential Office has identified the levels of computer education for teachers. The CTC document states that at Level I, teachers should be able to:

1. Identify issues involved in the access to, use, and control of computer-based technologies in a democratic society, including, but not limited to:
 - a. the potential for positive and negative impacts upon the quality of life in the workplace, the home, the marketplace, and leisure activities;
 - b. the moral, legal, ethical implications; and
 - c. the economic and social implications including the need to provide equitable access to the benefits of technology.
2. Demonstrate
 - a. knowledge of basic operations, terminology, and capabilities of computers-based technology;
 - b. use of computer hardware, software, and system components for their various functions.

The CTC document states that at Level II, teachers should be able to:

1. Demonstrate, appropriate to the subject area and grade level, a basic understanding of and an ability to use representative programs from each of the following categories:
 - a. *computer applications and tools* such as word processing, data bases, graphics,

spreadsheets, telecommunications, networking, and program languages;

b. *computer based technology assisted instruction* and learning, such as simulations, demonstrations, tutorials, and drill and practice; and

c. *teacher utility* programs such as those for record keeping, generating instructional materials, and managing instruction.

2. Demonstrate within appropriate subject areas and grade levels, the application and use of a computer-based technology as a tool to enhance the development of problem solving skills, critical thinking skills, or creative processes. Examples of such skills and processes are: gathering and analyzing data, generating and testing hypotheses, classifying, comparing and contrasting, inferring, evaluating, composing, and designing.
3. Demonstrate the integration of computer-based application into instruction in the candidate's selected subject area and/or grade level.
4. Recognize the range and versatility of computer applications in education.
5. Understand the effects of different software programs on students -affectively, cognitively, and socially.

6. Locate and use reference and resource materials to aid lesson planning.

Teachers acquiring a clear teaching credential in California must meet the above requirements, but can receive training in a variety of ways. Local universities, city colleges, and school districts offer courses designed to teach teachers these skills needed to integrate technology into their classrooms.

A well rounded exposure to technology, including word processing, database and spreadsheet applications, a grade book application and computer aided instructional software evaluation with some knowledge of programming, is what most technology experts, including Munday et al. (1991), agree is a good start. As the 1990s progress, more emphasis is being put on computer assisted instruction, application software, telecommunications, multimedia, and interactive videodisc technology.

The many skills listed in this section are the skills that teachers need to learn in order to integrate technology into their classrooms. Smith, Houston, and Robin (1995) say that without these basic skills, teachers do not have the foundation to provide an education integrated with technology for their students. Districts and school sites need to first look at the skills they want their teachers to know before they plan an inservice program.

Which ever way districts and individual sites go about the training of teachers, the basic skills of computer

technology and the important elements needed for successful curriculum integration need to be addressed.

Unfortunately, bureaucracy often gets in the way of many schools' plans of providing the training necessary for successful integration into today's schools. Glenn (1993) agrees:

Funding, school organization, and structure, and limited inservice for experienced teachers will continue to slow the process of integrating technology into the classroom (p.19).

Schrum (1991) recommends when teachers are asked to learn new and sometimes difficult skills, schools and school districts need to find ways to provide adequate skills training on both the basics of technology and on its integration into the classroom.

ENVIRONMENTAL SUPPORT

Hurst (1994) says that in order to provide adequate environmental support, a school site needs to find out what its staff actually wants in regards to technology. It could be as simple as a place such as a lab or a training center where teachers feel comfortable learning the necessary skills in technology, or just a number to call when a teacher needs help. It is also important that the inservice training be on-going. Teachers need support well after they have been introduced to a new technology.

Bell (1995) says that using "in-the-trenches" teachers as trainers provides a supportive environment to teachers.

They are readily available on site for new learners and usually highly motivated and excited about teaching with technology. The environmental support has got to be available, nearby and useful for teachers to really feel that safety cushion.

And finally, support needs to come from the top. The administrators need to incorporate technology into their daily lives as examples for their teachers. Schuster (1993) agrees that teachers will feel supported when their questions are readily answered, hardware and software is kept up, and time is spent creating an atmosphere that technology is important and will continue to be for a long time at their school.

TIME AND ACCESS TO TRAINING

Technology integration into the curriculum does not happen overnight. A school or school district cannot expect that simply by purchasing hardware and software, its teachers will soon become master technology teachers. Hurst (1994) reports that many teachers have said that although their inservice training in technology had been positive, it was too short and too infrequent, meaning there was no follow up or on going support.

One form of environmental support is time. An important issue to consider is the time constraints that teachers have everywhere. Often it seems forgotten that from about 8:00 A.M. until 2:00 P.M., a teacher's day is taken up teaching.

Where and when does (or should) a teacher find the time to truly learn how to use technology effectively in his classroom?

But to remedy this time issue as a form of environmental support, many sites offer one shot deals of free-for-all technology. For example, a site may hire a product (such as Apple) representative to come to a school, set up a lot of equipment, offer a demonstration of various technologies, let the teachers test them out, and then pack it all up and exit, perhaps leaving a few booklets and programs behind. This obviously is no way to teach anything. It may get the teachers excited for a few days, but that excitement quickly wears off when frustration from lack of equipment at the site or when the realization that there is a also a lack of knowledge sets in. Hurst (1994) agrees:

An intensive, one day inservice the day before students arrive for fall classes is not the best approach, and yet I see this happening year after year in school systems across the nation. Technology inservices will be far more effective when teachers have access to them as needed (p.75).

One solution is to match teachers' available time to use the computer lab with the availability of the lab itself. Hurst (1994) speaks of a common problem where the labs and technology-filled rooms are not always available to teachers when they really have the time to utilize them. Hawkins (1994) also says that teachers need options for trying out new things that do not cut too much into their personal time.

A second solution that other districts and sites have turned to is to allocate monies for workshops to be held at varying times to meet its particular staff members' needs. Many classes are held on Saturdays, after school, and during planning or inservice time. A particular program that holds workshops like those just mentioned is in Kissimmee, Florida and will be described further in a later section of this chapter.

A third solution, according to Orwig (1994), is demonstrated in Ft. Meyers, Florida. There, money is set aside to provide for two substitute days for each classroom teacher to attend training, conferences or spend it otherwise training in technology. Hawkins (1994) agrees with schools providing valuable release time, saying,

Provide time during release days or at district designated inservices . . . Having time to explore, ask questions, try out some options, and plan with colleagues is essential. Time equals opportunity to relax. Providing lots of time leads to more involvement and investment (p.17).

Similarly, a fourth solution calls for principals to get involved in helping their staff members find time well spent learning about technology. David Thornburg and Alan November (1994) advocate that principals spend at least one day per week covering classes so that teachers can visit other classes and get technology ideas. They also recommend that schools allocate money to be spent for every hour a teacher uses to train a fellow staff member in some sort of technological area.

A fifth solution is for school districts and individual sites to add a person, a well trained individual to help with teachers' use of technology in the classroom. Schmeltzer (1995) agrees that even a consultant to be on hand on a regular basis would take some of the stress off the teachers. With added personnel, time to learn the needed skills to competently approach the issue of teaching with technology might actually materialize.

Time is a valuable resource. If a school is willing to invest in hardware, it must invest in providing time for its teachers as well. Time is precious to a teacher. In Schuster's (1993) article in the journal *Electronic Learning*, Scarlet Hariss, a teacher at a school in St. Augustine, Florida shares this:

The many meetings and training sessions were exhausting. We all griped. Let me tell you, we griped: 'I can't believe he's making us do this' (p.30).

But the same teacher shared later that the time spent learning to integrate technology into her classroom was indeed time well spent when she saw the benefits from actually doing it.

November (1993) concurs that if full technology integration is to take place, this time for training must be made available. Teachers should be encouraged to learn all the time, everyday.

MOTIVATIONAL SUPPORT

In spite of increased hardware and software access, and training for the acquisition of computer skills, there are still educators who are simply not interested in learning anything about technology. Many districts and individual sites have gone the 'bells and whistles' route. That is, they purchased the equipment, scheduled a day to show it off to their staff, and expected teachers to be dazzled and overcome with awe and enthusiasm. Bell (1995) puts it this way, "We figured if the teachers just saw the software, they would buy it and use it" (p.16). This was not the case.

Fostering motivation is a key element. In Bauschbaum's article in the journal, *Electronic Learning*, Nate Bush of the Washington D.C. School Board agrees. "The difficult thing is to engage the teachers and principals" (p.19).

The first effective way to increase motivation among teachers is to have an active planning session with a site's whole staff that will give the teachers more ownership of the whole integration process. Dyrli and Kinnaman (1995) go as far as to say that teachers need to be given a lead role in this planning by school administrators. Because schools often fail to include teachers in this process, teachers feel threatened when told that what they do in the classroom is not good enough. Hawkins (1994) agrees,

While change is inevitable and desirable, it is not well received in the schools when the approach to it implies that what has preceded it is no longer valid (p.16).

But convincing hardened teachers about the need for technology in schools can be difficult to do. Hurst (1994) agrees, "... enticing teachers to chuck the chalk and pick up the mouse is not always simple" (p.74). Hannafin and Savenye (1993) concur that some teachers simply do not buy into the idea that computers can improve learning outcomes. They also share the view that teachers may feel that they are losing control of what is called, "center stage," or that they might look stupid in front of their class (Hannafin & Savenye, 1993). Anxieties may surface because many teachers are afraid that they will have no support in their use of technology. Using technology not only requires certain and sometimes difficult skills, but it also requires teachers to take a decidedly different role when using it in the classroom. Suddenly, they are not completely in charge. Hannafin and Savenye (1993) agree that this is frightening for some teachers. Being given a lead role in the planning of technology integration may ally some of these fears and anxieties.

Hawkins (1994) proposes a second way for sites to foster motivation among teachers. It is for officials to provide time for discussion among teachers about ways to integrate these strategies within the teachers' own classroom. This discussion time is often crucial for teachers acquiring new skills. Just knowing that their peers are experimenting and trying out new things with technology will help the learning process and hopefully motivate them as well. Feil (1996)

writes about 1995 Educator of the year, Kathy Popp, whose district realized that they needed a person to coordinate the teachers' use of technology. Popp says,

Sometimes it's just listening, talking through some troubleshooting, telling them what kind of software is out there, listening to problems. This administration says my time is better spent with teachers (p.41).

Schools with successful technology integration take the time to allow for discussion and sharing to foster motivation. They also involve the whole staff. Hurst (1994) buys into the fact that individual site plans on technology integration will only be successful if teachers and principals are involved in the planning from the beginning.

At Roger Coffee's school in Florida, every teacher is involved and expected to become an expert at something, whether this be the use of a laser disc player or learning copyright laws (Schuster, 1993). This way, the staff members become the trainers, and who better to learn from than the people around them every day who know what they are going through? Motivating a staff can come from within its own ranks. Getting the staff to take a vested interest is the key to effective training (Bell, 1995). The more the teachers collaborate, share and expand on ideas of technology, the faster and stronger the skills will take root. Schuster (1993) reports that by using his own staff members as trainers, Coffee's school actually saved money.

Motivation should increase if administrators create an environment where teachers feel comfortable. This is the key to successful inservice training. Coffee believes that this flexible environment is vital to a teacher's willingness to learn. In this environment, teachers feel that risks can be taken (Schuster, 1993). Dyrli and Kinnaman (1995) discuss further this comfortable situation,

. . . administrators must provide teachers with professional climate that encourages and enables them to innovate, invent, reflect, and develop (p.46).

In this comfortable, non-threatening atmosphere, Bell (1995) suggests that trainers speak to the unconverted in the language of the classroom, not techno-jargon. It is important to put technology into human terms to show teachers how, with proper training, technology can actually serve them and not vice versa (Buchsbaum, 1992). Knowing that computers can actually help can turn an unmotivated teacher into a technology using teacher.

Schools and districts need to keep this in mind: There will be many different types of teachers to reach at any individual site or district training session. Finkel (1993) says,

You can safely assume that your district runs the full gamut, from the totally uninitiated (and uninterested) to the know-it-all-techie (p.18).

A third way way to reach all types and foster motivation is to offer incentives. In Washington, D.C., both credential

clearing credits as well as university graduate credits are offered for teachers who participate in training. Of course, the sessions are free (Buchsbaum, 1992). Orwig (1994) reports on a school district near suburban Chicago with this enticing offer:

When staff members commit to the voluntary 70 hour program, they receive a basic computer valued at \$1550 (or, if they wish to purchase a higher-end computer, pay the difference through payroll deductions) (p.74).

Roger Coffee in Florida allowed his teachers to take their computers home to provide a little extra incentive to use and integrate technology into their personal lives as well as in their classrooms.

Finally, teachers must see the value, purpose and relevance of technology integration (Hawkins, 1994). Teachers must institutionalize the integration of technology into the curriculum. They must see the training program as a matter of course. The learning of technology must become a major educational standard. The more it is institutionalized, the more knowledge will be accessible to them and the more teachers will buy into the fact that their individual site is committed to technology. Hopefully, they will soon want to integrate technology into their own classroom as well (Hurst, 1994). As the educational system in this country realizes that technology is pervasive and can only become more so, it will have to revamp its ways of teaching children. Teachers who embrace the use of technology in schools will be the pioneers leading the way.

SUCCESSFUL INTEGRATION: SEVERAL EXAMPLES

When all the necessary ingredients come together, exciting things can occur. There are many programs out there that have led to fully integrated classrooms, equipped with motivated, well trained and supported teachers. Here is just a highlighted few.

The entire school district in Washington, D.C. has led a quiet revolution in its approach to teacher education in technology that began back in 1983. To begin with, it is important to note that more than half of monies spent on technology in the district is spent towards district staff training. That is over \$2 million. With the large monetary emphasis on teacher training, this district is telling its teachers it is important for them to know how to integrate technology into their classrooms. They are saying, "We're committed to teaching you what you need to know" (Bauschbaum, 1992).

The district has established the Center for Instructional Technology and Training, armed it with its own budget of \$1.6 million and dedicated it totally to staff development. The director of the training center, Jenelle Leonard, credits the board with creating the centralized training facility that is the key to the success of the training program. The board credits her with putting the technology into human terms that help the teachers relate

better with acquiring these new and needed skills (Bauschbaum, 1992).

The center offers free classes at almost any time of day in a non-threatening atmosphere. Teachers' valuable time was taken into consideration. The center is available often so teachers can choose when they come in to use the equipment. It is equipped with state of the art hardware and software as well as ample personnel support. Teachers are supported in their use of technology not only through hardware, but personnel as well. The human factor was also taken into consideration. Teachers in this district have a place they can go to and a person to ask questions. Teachers may also earn college credit towards clearing their credential or a graduate degree. Motivation is fostered when teachers see the rewards they may get if they take their technology training seriously. College credit and the hope of moving up on the pay scale is a great motivating plan that this district has taken a hold of (Buchsbaum, 1992).

Analyzing the Washington D.C. program using the three causes of nonperformance investigated in this paper, it becomes clear that it is successful because it has all three components met. The teachers are required to learn the skills necessary to integrate technology into their classrooms. They are given motivating incentives such as college credit to further their knowledge. and they are well supported environmentally by personnel, time varied workshops, and adequate hardware and software upkeep. With

its emphasis on professional development in technology, Washington D.C.'s school district is an example of how good ideas and good planning can work.

The poor, rural community of Chestnut Ridge, Pennsylvania gained an ally when Educator of the Year for 1995, Kathy Popp, became technology coordinator. Her commitment to teacher training in technology has triumphantly led this tiny community into the 90s (Siegel, 1995).

When Popp was named coordinator of technology for the small district, she put together a newsletter that keeps her teachers informed of some of the things other teachers are doing in technology. She started small with the small pockets of interests that already existed. That is, she worked with the the teachers highly motivated about technology already. By starting with the already motivated teachers, Popp and her district officials hoped others would be motivated when they saw the kinds of things these teachers are doing in their classes with technology (Siegel, 1995).

She is constantly helping to write grants for more funding; she recruited community members to help write the district technology plan; and she teaches training classes for interested parents as well. Having a person in charge of technology integration gives teachers human support to try new and exciting things in their classrooms. Chestnut Ridge went from Commodores and Apples IIes to having one of the best technology programs in the state of Pennsylvania (Siegel, 1995).

The program in Chestnut Ridge is successful because all three causes of nonperformance are addressed. Popp is the district's coordinator who has gathered motivated teachers to use as site advisors to provide on going environmental support. These teachers and Popp herself provide skills workshops and discussion groups where teachers can share ideas, fears and strategies. She helps her teachers acquire money for actual equipment and constantly touts her teachers' accomplishments in technology integration to hopefully motivate other teachers to follow suit. With Popp's guidance, this district supported its teachers' use of technology in hardware, training and support.

Most people would take classes if they were to receive a computer of their own after the training was completed. That is what teachers have the option of doing in Lake Park, Illinois. Staff members teach their co-workers in low key college level courses. Both trainers and students receive credit toward their 70 hour goal. At the end of the 70 hours, all participating teachers receive a basic computer. Lake Park is in its third year of this incentive-based technology training program. Training has evolved from basic word processing skills to integration of technology into the curriculum. Excitement is high in Lake Park as teachers are acquiring not only the necessary technological skills, but a computer as well (Orwig, 1994).

Motivation is one of the keys to a successful inservice. Lake Park used the free computer to foster

motivation, but also provided a 70 hour skills training program in basic skills and integration techniques and supported it with ample on site and on going personnel.

Webster Elementary School in St. John's County, Florida, owes its success story to its principal, Roger Coffee, whose commitment to technology has led to an almost 100% participation of his staff members in the school's technology grant (Schuster, 1993).

His teacher-expert model requires teachers to be an expert in something technological. Teachers feel confident in their area, but are also willing to share and learn with other staff members. He also encourages his teachers to take their computers home. Time is provided for these teachers to explore and learn on their own. His command of technology is also very motivating to his staff. He keeps them all connected with a network through which he sends out newsletters and personal messages to individual teachers, among other things (Schuster, 1993).

This school in Florida has honed in on the environmental support issue. The teachers here are supported in their use of technology in as many ways possible. This feeling of support fosters motivation and this leads to teachers wanting to learn more skills needed to fully integrate technology into their classrooms. The cooperation of all staff members beginning with the principal has led to the successful integration of technology in St. John's County, Florida.

SUMMARY

Mager and Pipe write that there are three main factors that can affect the integration of technology. Successful programs reviewed in this chapter worked because all three of these factors were taken into consideration. Not only was adequate hardware and software purchased, and proper training in technological skill areas taught, but the idea of fostering motivation and providing ongoing support to teachers was addressed as well, to keep teachers comfortable with integrating technology.

CHAPTER III

METHODS AND RESULTS

METHOD

According to Earl Babbie (1990), in his book, *Survey Research Methods*, there are three basic objectives of survey research: description, explanation, and exploration. Description involves making descriptive assertions about some population, for instance the distribution of particular attributes or traits. Explanation adds to this objective by making explanatory additions about that certain population. And exploration can provide a so called search device. That is, a sort of a beginner survey to test the waters of a particular topic.

In this paper, a survey design was used following closely the objective of descriptive research. The idea was to take a sample of the population of teachers in the area, gather demographic data, and find out if the reasons they fail to fully integrate technology into their classrooms can be attributed to skill deficiency, motivation, lack of environmental support or a combination thereof.

Population

The author identified the population relevant to the investigation of the issue of technology integration in education, particularly in the Inland Empire. The following

criteria were used in identifying the population for the survey. Subjects will include:

- teachers who are required to integrate technology into the curriculum as mandated by the California Clear Teaching Credential.
- teachers who are required to have training on computer skills integration.
- teachers who are working on clearing their teaching credential by taking a course at a university or through the district.

Sampling

A representative group from this population was identified to include teachers who chose to go to California State University, San Bernardino (CSUSB) to clear their credentials. The samples for the survey were identified by going arbitrarily into a particular quarter (Fall, Winter, Spring or Summer) and randomly selecting between two courses that are available for that quarter, Educational Technology (ETEC) 537 and ETEC 546. The survey was conducted in Winter Quarter 1996 in five sections of the course ETEC 546.

SUBJECTS

Eighty three subjects participated in the survey. They range in age from early 20s to late 60s (See Table 1). Both male and female subjects are included (See Table 2).

Table 1

Age Distribution of Respondents

	N=83	%
Age 20-25	16	19%
Age 26-30	20	24%
Age 31-35	12	14%
Age 36-40	10	12%
Age 41-45	13	16%
Age 46-up	9	11%
No Answer	3	4%

Table 2

Gender Distribution of Respondents

	N=83	%
Female	19	65%
Male	54	23%
No Answer	10	12%

MATERIALS

The questionnaire (See Appendix A) that was developed consists of a demographic section (Section One) followed by four sections designed to gather data concerning the three causes of low technology integration in education as given in the first chapter: skill deficiency, motivation problems, and environmental support.

As mentioned earlier, Section One of the questionnaire consists of demographic information; age and gender.

Section Two of the questionnaire is a series of general attitude statements that will help gather data on two of the three main factors discussed in this paper: motivation (including the importance and need for technology integration) and environmental support. The questions were designed according to the survey goals, but were regrouped on the actual survey so as not to reveal the purpose of the questions. The teachers were asked to respond to the statements using the following scale:

- 1 = Strongly Disagree
- 2 = Disagree
- 3 = Agree
- 4 = Strongly Agree

Motivation

The first group of statements in Section Two measures how well motivated teachers are about integrating technology into the curriculum. Subjects responded to the following statements:

1. I put time aside to learn about computers.
2. It is important for me to learn to use computers.
3. I am comfortable with operating a computer.
4. I am afraid to use computers.
5. I have little time to use computers.
6. It requires a great deal of knowledge and skill to use computers.

7. Computers are easy to learn.

8. Computers make work harder.

These statements address the feelings, determination and attitudes teachers have concerning technology, and identify their willingness to take the time to learn the needed skills to adequately teach using technology.

Importance of Integration

The next group of statements in Section Two measures how strongly participants feel about the importance of technology in education. Subjects responded to the following statements:

1. Teachers need to teach with computers.
2. Teachers need to teach about computers.
3. Computers are needed in schools.
4. I need to teach basic word processing skills.
5. I use computers at my site.

These statements were written to evaluate the importance of computers being integrated into education and to look at teachers' actual computer usage. Overall, these statements were designed to gather information about how important it is to teachers that technology is integrated into the schools, which can be used as an indicator of their motivation level.

Environmental Support

The final set of statements in Section Two was written to glean information about how teachers evaluate the level of

support given at their individual sites. Respondents were asked to rate the following statements:

1. Training on computers is provided at my site.
2. I feel supported in my use of computers at my site.
3. There are enough computers at my site.
4. I have access to a computer at my school site.
5. It is easy to teach with technology at my site.
6. Time is allowed for me at my site to learn about computers.
7. Computers are available to me and my students.

Questions 3, 4, 7 deal with access of equipment and assess how teachers view their site in this kind of support. Questions 1 and 6 deal with training and time provided for learning the needed skills and indicate how teachers view their site in terms of support in this area as well.

Questions 2 and 5 assess overall how well supported teachers actually feel.

Two additional and related questions to Section Two were asked after these statements to specifically find out if teachers have at least one computer in their classroom, and to find out how these teachers actually acquired their computer(s). The questions were asked in the survey in the following way:

*Do you have a computer(s) in your classroom?

_____Yes _____No

*If yes, how did you acquire it/them?

Given it Asked for it Through your own efforts

The response to the first question is expected to show both environmental support or lack thereof. It is expected that the site will at least provide a computer to each teacher. The second question is a motivation indicator. It will identify teachers who have the initiative to go out of their way and acquire computers for their classroom any way they can, often overcoming low environmental support. One statement from Section Two ('I use computers at my site.') is a related statement and will be analyzed with the above two questions.

Section Three is a set of questions on individual site assessment. Teachers rank their site, (five being good, their site is excellent in providing support in the needed areas of technology; one being poor, their site is deficient in providing adequate support of their use of technology) in regards to availability of equipment, support and time. Respondents ranked their site in the following areas: software, hardware, training, support personnel in technology, and time put aside to learn more about technology integration. The information gathered from this section will show how teachers rank their own environment and if indeed that "safety cushion of support" is in place. Section Three appeared as follows.

*Rate your site in the following areas:

	Poor			Good	
Hardware:	1	2	3	4	5
Software:	1	2	3	4	5
Training:	1	2	3	4	5
Personnel Tech Support:	1	2	3	4	5
Time put aside to learn about computers:	1	2	3	4	5

Skills/Knowledge of Technology

Section Four of the survey was designed to garner responses that will show how well trained teachers consider themselves in the use of technology. It consists of a skills inventory where teachers ranked themselves, (one being poor, indicating that the respondent feels he/she knows little or no technology skills; five being expert, indicating the respondent feels efficient in basic computer skills) on how well prepared they feel in the knowledge of: database, spreadsheet, e-mail, the Internet, curriculum integration, laser technology, multimedia, authoring programs, CAI classification and CAI evaluation. This section was designed to show whether or not teachers sense a skill deficiency in themselves. The literature in the previous chapter stated that these skills were the basic computer skills that teachers need to have for the integration of technology into the curriculum. The following is taken directly from the survey:

*As a result of the computer classes in the Credential Program, rate your level of expertise in the following:

	Poor				Expert
a. Word processing	1	2	3	4	5
b. Data base	1	2	3	4	5
c. Spread Sheet	1	2	3	4	5
d. E-mail	1	2	3	4	5
e. Use of the Internet	1	2	3	4	5
f. Integrating Technology into Curriculum	1	2	3	4	5
g. Laser Technology	1	2	3	4	5
h. Multimedia	1	2	3	4	5
i. Authoring Programs	1	2	3	4	5
j. CAI software classification	1	2	3	4	5
k. CAI software evaluation	1	2	3	4	5

DATA GATHERING

During the Winter Quarter 1996 at CSUSB, this survey was conducted in five sections of ETEC 546 classes. Students enrolled in the five sections of this class are either currently teaching in California clearing their credentials or are candidates for a Preliminary California Teaching Credential and are either student teaching or will be in the near future.

Those wishing to possess a Clear Teaching Credential must meet goals specified by the State of California Levels I and II Competencies in computer education within five years of receiving a Preliminary Credential. These goals were

listed in Chapter 2. ETEC 546 is the second of two courses at CSUSB designed to meet these competencies. These teachers and future teachers were used as the pool of survey subjects in this study.

After identifying the group to be surveyed and contacting the professors of the five sections of ETEC 546 classes in the Winter Quarter 1996 at CSUSB, arrangements were made to administer the survey to the teachers and future teachers in each section of the class. The survey took approximately fifteen minutes to complete. No one was forced to participate. The subjects were told only that the questionnaire was part of this graduate student's final thesis project and were given information general enough to understand the goal of the survey, but not too specific to influence responses. The Institutional Review Board form needed to conduct survey research at CSUSB is found in Appendix B.

RESULTS

To analyze results, survey responses for Sections Two through Four were tallied and percentages were computed. Related statements were regrouped and results referring to the same factor were described together for better analysis. This section presents a description of results; analysis, explanation and exploration (Babbie, 1990) are presented in Chapter 4.

Section One was a set of questions written to gather demographic information. Earlier in this chapter, tables showing the breakdown of participants' age and gender were listed. As shown in Table 3, a little more than half (53%) of the respondents indicated they were currently teaching.

Table 3

Teaching Status of Respondents

	N=83	%
Current Teachers Clearing their Credentials	44	53%
Preliminary Credential Candidates	22	27%
Not Applicable	17	20%

One particular statement in this survey investigates what this paper is trying to address in general: the use of technology among teachers. This statement, 'I use computers at my site,' is found in the second grouping of statements in Section Two. Regardless of whether the reasons for nonperformance in some schools is(are) lack of motivation, skill deficiency or low environmental support, the main issue is about teachers using technology. According to the data for this statement (See Table 4), most teachers (72%) acknowledged the use of computers somewhere at their sites. As the rest of the survey results are further analyzed, it is expected that details and explanations of actual teachers'

use of technology, and their reasons for lack of integration, will emerge.

Table 4

Use of Computers at Individual Sites

	Agree	Disagree	N/A
I use computers at my site.	72%	19%	9%

Motivation

As shown in Table 5, the 83 teachers surveyed gave responses overall that show that they consider computers and technology important aspects of their teaching life in the 90s. For better analysis, the motivation survey statements were reviewed as groups of positives and negatives. Except on one item, most responses indicated a high degree of motivation among teachers. That is, 68-99% of teachers agreed with statements worded positively and 64-90% disagreed with statements worded negatively. On the statement, 'I have little time to learn about computers,' there is almost a 50-50 split (47%-51%) on whether the amount of personal time teachers say they have for learning how to use technology effectively is limited or not.

Table 5

Motivation Level of Respondents

	Agree	Disagree	N/A
It is important for me to learn about computers.	99%	1%	
I am comfortable with operating a computer.	79%	21%	
Computers are easy to learn.	68%	29%	3%
I put aside time to learn about computers.	89%	11%	
I have little time to learn about computers.	47%	51%	2%
It requires a great deal of knowledge and skill to use computers.	36%	64%	
I am afraid to use computers.	16%	84%	
Computers make work harder.	10%	90%	

Importance of Integration

As for the importance of technology integration in education, which is linked to motivation, data gathered (See Table 6) show a high percentage (89-98%) of agreement from teachers to statements on the need for technology and its integration in education. One statement, 'I need to know basic word processing skills,' received a lower ranking (63%).

Table 6

Importance of Technology Among Respondents

	Agree	Disagree	N/A
Teachers need to teach with computers.	89%	11%	
Teachers need to teach about computers.	90%	10%	
Computers are needed in schools.	98%	2%	
I need to teach basic word processing skills.	63%	30%	7%

Environmental Support

In the area of environmental support, there is less consensus among teachers than the areas of motivation and overall importance. Again the statements are regrouped for better analysis. As seen in Table 7, the only overall majority response was to the statement, 'I have access to a computer at my site.' 81% teachers surveyed have access to a computer. 65% of teachers surveyed have an actual computer in their classroom. Most teachers agree on the fact that not enough time is allowed for them to learn about technology at their site and that there are not enough computers at their sites.

Table 7

Environmental Support Levels

	Agree	Disagree
I have access to a computer at my site.	81%	12%
I have a computer in my classroom.	65%	22%
Computers are available to me and my students.	58%	32%
There are enough computers at my site.	23%	66%
Training on computers is provided at my site.	38%	50%
Time is allowed for me at my site to learn about computers.	33%	57%
I feel supported in my use of computers at my site.	55%	33%
It is easy to teach with technology at my site.	47%	42%

Table 8 shows the responses to the question, 'How did you acquire the computer in your classroom?' Of the 54 teachers (65% of 83) who actually have a computer in their classroom (See Table 7), 40 (74% of 54) were given the computer by their site officials or their classroom came equipped with one. As such, data from these teachers will not serve as as indicators of teacher motivation level.

However, 14 (26% of 54) of those who said they have a computer in their classroom indicated having taken some initiative to acquire the equipment either by asking directly (12%) or by their own efforts (14%).

Table 8

Computer Acquisition Among Respondents

	Given it	Asked for it	Own efforts
How did you acquire the computer?	74%	12%	14%

The results of the individual site assessment as shown in Table 9, relate a dismal scene. Not even a quarter of the respondents ranked their site as being good in providing the technology support and services listed. Most of the 83 teachers surveyed chose to rate their sites as neither poor nor good (category 3). However, total percentages for categories 1 and 2 (poor) are higher than the total percentages for the categories 4 and 5 (good).

Table 9

Site Assessment Given by Respondents

	Poor				Good
	1	2	3	4	5
Hardware	14%	16%	29%	16%	12%
Software	15%	18%	33%	13%	9%
Training	27%	21%	24%	9%	9%
Personnel Tech Support	21%	18%	24%	16%	9%
Time put aside to learn about computers	27%	27%	24%	6%	4%

Skills/Knowledge of Technology

The results of the individual skills assessment (See Table 10) where teachers ranked themselves on their personal knowledge of technological skills, give some mixed responses. No overall trend was observed. Some teachers consider themselves near experts in one area, others in another area. The trend was to choose middle ground as indicated by higher percentages under category 3 in most items. Only word processing skills had a 51% rating in the 4 or 'almost expert' category. Database and spreadsheet each received a 46% in the 3 category.

Table 10

Skills Assessment of Respondents

	Poor 1	2	3	4	Expert 5
Word Processing	0%	4%	29%	51%	16%
Data Base	6%	17%	46%	22%	10%
Spread Sheet	6%	17%	46%	22%	7%
Multimedia	9%	27%	40%	16%	7%
Laser Technology	23%	35%	29%	6%	4%
E-Mail	16%	29%	25%	18%	7%
Use of the Internet	16%	35%	31%	11%	4%
Authoring Programs	35%	23%	24%	6%	1%
Integration of technology into the curriculum	3%	24%	41%	22%	9%
CAI Classification	33%	23%	25%	7%	5%
CAI Evaluation	28%	22%	27%	15%	4%

In the next chapter, analysis of these results will be offered as well as a summary of the results and recommendations for future investigations.

CHAPTER IV:

ANALYSIS OF RESULTS, CONCLUSIONS, RECOMMENDATIONS

ANALYSIS OF RESULTS

This project investigates the use of technology among teachers. 81% have access to a computer, 65% have a computer in their classroom, 72% use computers at their site. What does this indicate? What explanation can be given about availability and use of technology? Does it indicate how it is used? Is there a problem of nonperformance?

According to Mager and Pipe's theory, the first area to look at when nonperformance is happening is motivation. Is technology not being integrated because the teachers are not motivated to do so?

As results indicate, there is a considerably high level of motivation and regard for the importance of technology integration among teachers in the Inland Empire. The intent and actualization of the motivation, however, seem to present some inconsistency. 89% of teachers say they put aside time to learn, but almost half (47%) contend that they have no time. The results indicate recognition of the need and willingness to take the time to learn the technology, but reality is teachers are so busy at work that they often do not have the time or do not prioritize and find the time for technology learning and integration.

The level of motivation for technology integration is supported by teachers' perception that learning about

computers is not that difficult (easy to learn-68%; does not require a great deal of knowledge and skill-64%). Fear of technology does not seem to deter teachers from learning it either nor from using it (not afraid-84%). Acceptance of the technology (does not make work harder-90%) and teachers' comfort level (comfortable using a computer-79%) also indicate favorable attitudes toward technology.

The acceptance and importance of technology among teachers was also reflected in their indication of a strong need for having computers in schools (98%) and for teaching about and with them (90%, 89%). Although significantly low, there is a noted difference between agreeing to have computers in school and in making them parts of their teaching responsibilities (need to teach word processing skills-63%). As the need became more specific to this responsibility, (i.e, from teaching with computers in general to teaching a specific application), agreement to this need and importance of technology integration decreased.

Overall, teachers' responses do not indicate anxiety, fear, perception of difficulty or presence of threat. There is a high level of motivation among teachers in the Inland Empire. Lack of motivation and lack of need or importance for the technology are not the causes for any lack of use or integration of technology among teachers in the Inland Empire.

When analyzing the degree of environmental support that these teachers feel they are receiving, it is important to

note the lack of consistency in results received. This was attributed to teachers' evaluating their individual sites and these sites can differ greatly.

The decreasing trend among respondents when assessing access to technology is as follows;

Access to a computer on site	81% agreed
Computer in classroom	65% agreed
Availability to me and students	58% agreed
Enough computers on site	23% agreed

Based on these percentages, there are computers on site, but not all of them are in the classroom (81% vs. 65%). Even with computers in the classroom, not all of them (65% vs. 58%) are available for teacher or student use, (i.e., integration of technology). This could explain the low percentage (23%) on having enough computers. Having access to computers and their physical availability does not necessarily mean having enough computers for teaching and learning. It is inferred here that the computers available on site are used for non-classroom purposes or are too old to support classroom teaching or provide more interactive computer capabilities.

In addition to having access to computers, environmental support for technology integration also comes in the form of training and time. These were rated low by teachers (training provided 38%; time allowed to learn 33%). They received lower ratings when compared to access to technology. Put together, (access, training and time) the overall

perception of support (53%) and ease of doing integration on site (47%) can be considered a very good indication of a lower level of environmental support that teachers in the Inland Empire receive for technology integration. Ratings for this level are lower than the ratings on teachers' motivation level.

Further data analysis on environmental support in technology integration was made on results of teachers' individual site assessment. While respondents rated their site moderately in most of the items (category 3), the trend in ratings is toward the lower or poor end (categories 1 and 2). This high percentage on the lower end of the scale is most evident in the three vital areas of environmental support: 39% for personnel technology support, 54% for time put aside to learn about technology, and 48% for training.

These data results support the hypothesis that environmental support could be the cause of nonperformance of technology integration in the Inland Empire.

The last thing Mager And Pipe say to look for when there is nonperformance is skill deficiency. As in environmental support results, teachers again chose the middle category (category 3) in most of the items, but they ranked themselves fairly high (categories 4 or 5) in the three mainstays of computer training (that is, applications that have been pushed the most and have been around the longest): word processing (96%), data base (78%), and spreadsheet (75%). All

three garnered high responses from the middle to the expert categories.

Higher percentages on the lower end of the scale (1 and 2) indicate a lack of basic skills in emerging or more sophisticated technologies of multimedia (36%), e-mail (45%), the use of the Internet (51%), laser technology (58%) and authoring programs (58%). Two items in this section of the survey specifically address integration skills: the ability to classify software, and to evaluate CAI software. Higher percentages on the lower end of the scale indicate a lack of expertise in these skills. Compared to the less specific item of 'integration of technology,' teachers tend to rate their integration skills higher in general and lower when asked to rate specific integration skills.

The above results indicate a higher level of skill deficiency among teachers in the Inland Empire when it comes to the more sophisticated technologies. The level of skill deficiency, when compared to motivation and environmental support, depends on the skill(s) in question. For basic computer skills, the level of skill deficiency is low and comparable to the motivation level of teachers. For more sophisticated emerging technological skills, the level of skill deficiency is comparable to the level of environmental support indicated by teachers in this survey.

CONCLUSIONS

There is a high level of motivation concerning

technology integration among teachers in the Inland Empire. As is evident in the data, teachers feel that technology is important to have in schools and they are not put off by a perception of its difficulty or anxiety about using it.

Teachers however, indicated that there is a need for more environmental support. Teachers in the Inland Empire do not feel well supported at their individual sites in their use of technology, especially in terms of personnel, training and time.

Knowledge and basic computer skills of teachers in the Inland Empire are both high and low depending on what is considered basic. While word processing, spreadsheet and database programs are programs teachers feel they are near expert level, the emerging skills of e-mail, multimedia, use of the Internet, and evaluating and classifying CAI's are skills teachers feel less confident in and require more training in.

Are teachers in the Inland Empire using technology? Yes, 72% of teachers say they use it. Overall levels of motivation, environmental support and skill deficiency seem to support this 72% rating by teachers. The level of use of technology among teachers in the Inland Empire does not seem to contradict the level of causal factors that were investigated; namely, the high motivation level, the lower environmental support level and a level of skill deficiency that depends on the computer skills reviewed.

Is there a lack of technology integration in the Inland Empire? This 72% rating is not an indicator of a serious lack of technology integration. This is supported by a high level of motivation; a lower, but not insufficient, level of environmental support; and an adequate level of basic computer skills.

In conclusion there is still lack of technology integration in the Inland Empire, but it is not critical. This lack of integration may be due to the lower environmental support and skill deficiency in emerging technologies. But the overall picture is favorable and optimistic. The lower level of skill deficiency in basic computer skills and the high motivation level provide a very strong foundation for future growth.

RECOMMENDATIONS

The first and most obvious recommendation that can be made based on the results of this survey is for more environmental support in terms of incentive-based training in the so called emerging technologies. Site administrators should find out where their teachers are at, skillwise and proceed to plan a training program that takes into account these varying levels. In this way, schools can provide the needed skills training to all their teachers, no matter the level.

In the best possible scenario, a district should have personnel just for the purpose of training. These support

staff members could then even visit classes and help the teachers implement technology right away in their rooms and get it working with their students.

Schools and districts have been spending money into acquisition of technology equipment for over a decade now, and are slowly but steadily realizing the fact that investing in technology takes more than just machinery. Teachers are learners as well and need to be provided with the opportunity and the time to acquire the needed skills to put technology into the hands of the future generation. When genuine, thought out and valuable staff development is made a top priority, then the change will be more likely to occur. Students today will learn the technological skills needed to soar into tomorrow.

The above recommendation will also help maintain teachers' high level of motivation. Teachers are always looking for better ways to teach. The high motivation is there already, so it just needs to be maintained.

For future research purposes, it is recommended that surveys like this be supplemented with qualitative data gathering methods, including interviews. Follow up interviews to survey responses can provide detailed explanation of the factors affecting the integration of technology in the curriculum and its presence or lack thereof.

APPENDIX A:

COMPUTER USE SURVEY

Hello and thank you for taking a few minutes to answer this survey about computers in education. Please read each question carefully and answer honestly the best way that you can.

Gender: Male Female

Age: 20-25 26-30 31-35 36-40 41-45 46-up

Educational Level:

 Credential Candidate Masters Program

Total years of experience: _____

Grade level(s) taught: _____

1= Strongly Disagree

2= Disagree

3= Agree

4= Strongly Agree

- | | | | | |
|--|---|---|---|---|
| 1. Teachers need to teach with computers. | 1 | 2 | 3 | 4 |
| 2. I put aside time to learn about computers. | 1 | 2 | 3 | 4 |
| 3. I am comfortable with operating a computer. | 1 | 2 | 3 | 4 |
| 4. I use computers at my school site. | 1 | 2 | 3 | 4 |

- | | | | | |
|--|---|---|---|---|
| 5. I am afraid to use computers. | 1 | 2 | 3 | 4 |
| 6. Computers make work harder. | 1 | 2 | 3 | 4 |
| 7. I know a little about computers. | 1 | 2 | 3 | 4 |
| 8. I have access to a computer
at my school site. | 1 | 2 | 3 | 4 |
| 9. I have little time to learn
about computers. | 1 | 2 | 3 | 4 |
| 10. Time is allowed for me at my
site to learn about computers. | 1 | 2 | 3 | 4 |
| 11. I feel supported in my use
of computers at my site. | 1 | 2 | 3 | 4 |
| 12. It requires a great deal of knowledge
and skill to use computers. | 1 | 2 | 3 | 4 |
| 13. Computers are easy to learn. | 1 | 2 | 3 | 4 |
| 14. There are enough
computers at my site. | 1 | 2 | 3 | 4 |
| 15. Computers are needed in schools. | 1 | 2 | 3 | 4 |
| 16. Training on computers
is provided at my site. | 1 | 2 | 3 | 4 |
| 17. I need to teach basic
word processing skills. | 1 | 2 | 3 | 4 |
| 18. Computers are available
to me and my students. | 1 | 2 | 3 | 4 |
| 19. It is important for me to
learn to use computers. | 1 | 2 | 3 | 4 |
| 20. It is easy to teach with
computers at my site. | 1 | 2 | 3 | 4 |

21. Teachers need to teach
about computers.

1 2 3 4

*As a result of the computer classes in the Credential
Program, rate your level of expertise in the following:

	Poor				Expert
a. Word processing	1	2	3	4	5
b. Data base	1	2	3	4	5
c. Spread Sheet	1	2	3	4	5
d. E-mail	1	2	3	4	5
e. Use of the Internet	1	2	3	4	5
f. Integrating Technology into Curriculum	1	2	3	4	5
g. Laser Technology	1	2	3	4	5
h. Multimedia use in Education	1	2	3	4	5
i. Authoring Programs	1	2	3	4	5
j. CAI software classification	1	2	3	4	5
k. CAI software evaluation	1	2	3	4	5

*Which of the following, if any, do you have at home?
(check all that apply)

____ Personal computer ____ Printer
____ Modem ____ CD-ROM

*Before Etec 537, had you ever used a computer?

____Yes ____No

*Do you have a computer(s) in your classroom?

____Yes ____No

*If yes, how did you acquire it/them?

Given it Asked for it Through your own efforts

*What application programs do you use/have you used in your classroom? (check all that apply)

____Word processing	____Games
____Data Base	____Graphic programs
____Drill and Practice	____Authoring programs
____Telecommunications	____Spread Sheet
____Others	

*Rate your site in the following areas:

	Poor			Good	
Hardware:	1	2	3	4	5
Software:	1	2	3	4	5
Training:	1	2	3	4	5
Personnel Tech Support:	1	2	3	4	5
Time put aside to learn about computers:	1	2	3	4	5

*Again, thank you for your time.

APPENDIX B:
INSTITUTIONAL REVIEW BOARD DOCUMENT

When administering the attached survey to adult students in Etec 546 classes during the Winter Quarter 1996, I will inform the subjects of the following:

--My name is Carol Doucette. I am a student working on an M.A. in Education: Instructional Technology.

--This survey is being conducted to assess attitudes and personal beliefs about computers and computer usage in an educational setting.

--In no way will your name be used in compiling data.

--Participation in this survey is voluntary.

--It will take about 15 minutes to complete.

--You may contact Rowena Santiago in the Instructional Technology Program at 5677 for any further contact.

--Finished Thesis with results of both surveys and analysis will be available in the Pfau Library after June 1996.

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